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ABSTRACT

A discussion of many career possibilities related to the sea is presented. The false impressions many people have about the sea and about marine careers are dispelled. Among the career areas examined are offshore industry careers such as oil and gas drilling, careers in fishing, in seafaring, marine recreation, oceanography, aquaculture, communications, ocean engineering, and other technical careers. There is an attempt not only to clarify the job responsibilities, duties, living conditions, and skills needed in these marine careers but also to dispell any false impressions of what such careers would be like. Also in the publication, discussions of where and how to get training and jobs in ocean related careers are given. A section is also included giving practical advice to young persons attempting to choose a career. (SB)

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Today's youth in tomorrow's sea

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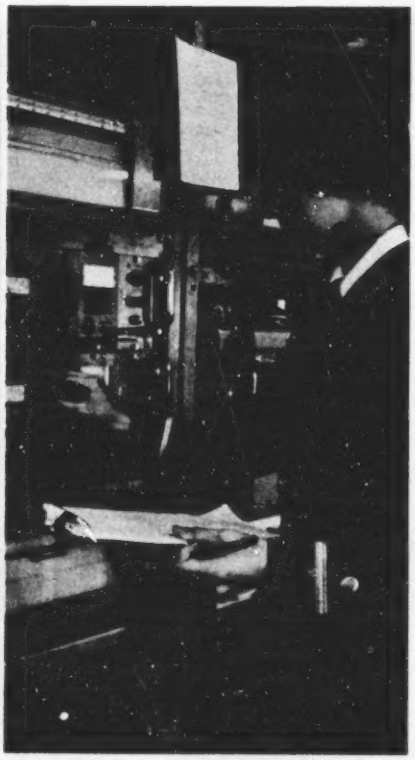

SE 024 451

Another title in the series

Marine careers

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

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Who are the sea people, and how do you find your place among them?

If we can blow away the sea mists that form a veil between impressions and reality, perhaps we can identify some sea careers and what they require in education and training. The trouble with getting down to reality is the sea itself. The sea is this small planet's last frontier of adventure and romance. It is a place of mystery and infinite fascination —beautiful, capricious, ever-changing, ever-alluring, ever-dangerous. The sea is a realm that fosters tall tales. From it illusions spring.

The illusions are most visible on TV and movie screens, where we get many of our ideas about marine careers, unless we are among those who live in marine communities and see personally who the sea people are and what they do.

The key point about TV programs and movies is that, to get and keep an audience, they must be entertaining. If a program does not capture and hold your attention, you discard it with the flick of a dial. If you think a movie is boring, you tell your friends. So producers must build their films and programs around what's dramatic, beautiful, different, intriguing, or terrifying. It is difficult to capture those elements film after film or program after program, so it is common for the producers to add a bit of hokum—sometimes a lot of it—to spice up the product and keep you tuned in.

Because coral reefs are especially fine for underwater photography, they are favorite film locations. So too many young people carry mental images of sea careers in the tropics, where coral reefs abound. The job opportunities in coral

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country are mostly for the photographers who specialize in beautiful underwater sequences, and even those opportunities are limited by intense competition. Among the sea scientists, only a fortunate handful are able to work in the land of coral, because that's *not* where the action is.

Instead, the action and the jobs are in the colder waters, particularly where there are serious problems to be solved, resources to be harvested, trade to be carried on, and marine services to be provided. The important kind of action is perhaps suitable for educational films and programs, but it cannot compete for an audience with sharks, performing porpoises, or the marvelous world of tropical reefs.

Sea voyages begin on land

There are many kinds of sea careers and many more that are related to the sea in one way or another. There are careers for every kind of person, for every degree of education, for nearly every sort of interest. With very few exceptions (mostly ship and boat handling and commercial fishing) the sea careers are marine applications of land skills and land knowledge.

After all, we are land creatures who go to sea for land purposes, and we go to the sea as intruders. Whether we harvest the food of the sea, collect raw materials, trade the world's goods, or add to knowledge of our water planet, our time at sea is brief.

It is an advantage that sea careers are mostly extensions of land careers, because the sea people can work at both. For many persons, a land job came first, and they applied land skills and experience to marine work when opportunity offered.

Because we are confused by false images, too many young people think of working in the sea in terms of science or diving. It is true that careers in science and diving do exist, but the people who work in those fields are a very small minority of marine careerists.

Another usual assumption is that sea careers always involve working on the water. A few careers do, but most do not. Instead, work is near the water, related to it in some way, or involved in the products of the water. For example, more than a quarter of the people working at marine jobs in the United States are engaged in building vessels. About two-thirds of these builders work on small boats and yachts, and a third are in shipyards building commercial and military craft. The boat and ship builders outnumber the people who actually go to sea.

Who, then, are the sea people? Compared to about 600,000 who actually work on the water all or some of the time, there are 120,000,000 persons who boat, swim, fish, or dive—making marine recreation the fourth largest industry in the country, and the largest employer among the marine industries. So, for every person who works on the water, there are 20 people who go to the water for fun. If love of seas, lakes, and rivers is what makes sea or water people, the recreation seekers certainly qualify.

This statistic about fun versus work has significance. If you are really committed to the sea as a career, that is fine. Stick to it, but be sure of your commitment. That means gaining a real understanding of what is involved, what the work is like, what kind of person you are, and what you expect from life.

If your interest in the sea grew out of boating, swimming, diving, or surfing, compare sea recreation with sea work. They are quite different. Although the work can be fun, too, you may find that you will be happier in a land job, going to the sea for recreation.

Memorandum to sport divers

The difference between sea fun and sea work is most sharply marked in diving. Because many young people fall in love with the world of water through sport diving and want to turn their sport into a career, some notes on commercial diving may be helpful.

First, it is important to recognize that, from the commercial viewpoint, diving is nothing more than a form of transportation, a way of getting to the job. Commercial divers are only as useful as their job skills. They must be able to do rigging, welding, cutting, and a variety of other tasks underwater. Furthermore, they must be able to complete a task in icy water when visibility is nearly zero and strong currents tug at them, because those are the conditions under which a commercial diver most often works.

The diving gear is seldom a simple scuba regulator and tank, but is far more complex and cumbersome. Because the water is almost always very cold, the diver has to wear a suit, often a heated suit that hampers movement. The diver may also be locked into a system that maintains divers under pressure on mixtures of helium, nitrogen, and oxygen, remaining in the pressurized system for several days, and then needing up to three days more for safe decompression.

Commercial diving pays well because it is dangerous, difficult, and uncomfortable. It bears about as much relationship to sport diving as professional football does to a game of touch. For the sport diver to go commercial means starting over, learning both the skills needed to do the job and the techniques of diving.

Diving scientists are quite a different group. They seldom need more than advanced sport diving skills and equipment, unless they are aquanauts working from an undersea habitat. The chances of being an aquanaut, by the way, are considerably less than the chances of becoming an astronaut. There may be an occasional undersea habitat program during the next few years, but the number of aquanauts who take part will be very limited, perhaps not more than a dozen.

Anyway, aquanauts are simply persons who work out of a habitat placed on the sea bottom, and not a special category. Commercial divers, who are not generally called aquanauts, often work out of diving systems that are the equivalent of habitats.

Diving scientists are scientists who dive. They are scientists first, and divers second. Like aquanauts, they are not a special category. The same is true of engineers. Many ocean engineers dive as an aid to their research and development activities, but they are engineers first, and divers incidentally.

Commercial divers, however, are a special category of people trained in both the underwater applications of a variety of skills and in use of commercial diving systems. The fully qualified and experienced divers are among the highest paid sea people, and they earn every bit of their pay under conditions of great discomfort and frequent danger. Their primary employment is in offshore gas and oil activities. Others are employed in salvage and repair.

There are two main routes to commercial diving: go to a diving school that gives a complete course and has a record of producing highly employable graduates, or join the Navy and try to qualify as a Navy diver, which takes the same amount of schooling but also offers an opportunity for a variety of diving experiences. Many commercial divers are ex-Navy people.

Careers in offshore industry

Clustered around the pursuit of petroleum and natural gas on the continental shelves is a great variety of vocations and professions. Take this series of events to see how some principal careers fit in.

First, oil and gas exist in relatively few places, and geological formations that look promising must be located under the seabed. Geophysical ships move up and down in planned grids, their instruments recording the nature of the subsea bottom. The instruments may send data as digital impulses direct to a computer aboard the ship, or the data may be recorded on tape for later analysis.

Petroleum geologists are in charge of the search, aided by skilled technicians who maintain, calibrate, and handle instruments, set up computer programs, or assist in data processing. The research ship itself has a full crew of deck and engine room officers and personnel.

When a promising formation is found, business and legal experts undertake the long process of bidding for a lease in competition with other companies. If the company managers decide to go ahead, a drill rig must be chosen to suit the sea and bottom conditions. The drill rigs, ranging from special ships and platforms to steel towers that would be higher than a skyscraper if positioned on land, are designed by naval architects and engineers, built in huge shipyards, and taken to sea by special crews.

Hundreds of people work on construction of the huge, expensive rigs, and they represent a whole range of skills. Some are workers who need little or no special training. Others are expert welders, riggers, mechanics, heavy equipment operators, warehouse workers, or machinists. There are mechanical, civil, electrical, and industrial engineers in both supervisory and design positions.

When the rig is completed, it is moved to position by special sea crews who are skilled in handling the ungainly constructions. Once in position, a different kind of operation gets underway, a combination of land drilling and sea operations. Drillers learn their business on land and apply it to the special case of offshore drilling. The drill crews rotate from shore to rig in crew boats, or, in some cases, by helicopters. Both forms of transportation require trained personnel.

The rig must be supplied with everything the crew needs to live and work, and a fleet of fast boats shuttles the materials from shore to rig. A drill rig is like a small city, which must have its quota of specialists to serve its population. There are cooks and kitchen crews, safety personnel, electricians, plumbers, and communicators, and all are on the high seas.

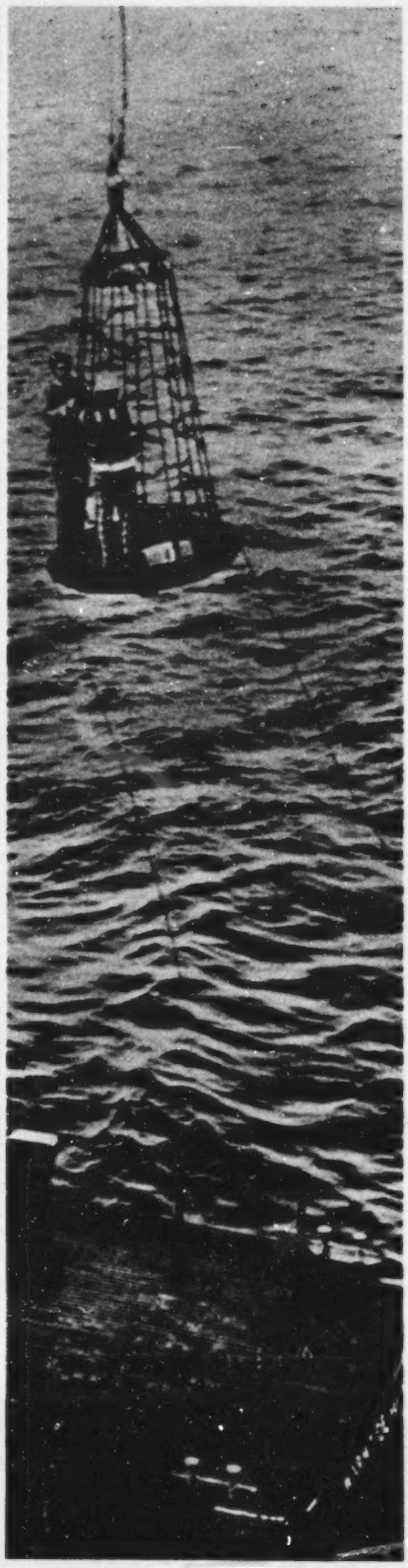
When oil or gas is found, commercial divers cap the well with an array of necessary controls, and a different crew lays the pipeline to shore under the sea bottom. Or crews may move huge storage tanks into place so the oil may be accumulated and stored, to be collected by tankers that arrive periodically.

If you think about it, you can envision the great variety of people needed to run the offshore oil and gas operations from initial search to final recovery. In terms of education, the requirements range from simple on-the-job training to advanced university degrees, covering all the varieties in between. In addition to the technical crews—those who work with hands or instruments—there are service personnel needed in support of the operations.

These include many clerical people (for example, those in the personnel offices and those who handle stock in the warehouses or on the platforms). You may not have thought of a clerk's job as a marine job, but often it is. The systems could not run without qualified clerical people.

Offshore operations are not sea vacations. The work is hard, and though every effort is made to keep living conditions as good as they can be, a drill platform is not a hotel. The service craft that ply between platform and shore often bounce and roll through rough seas. They must make their runs whether the weather is pleasant or stormy, warm or icy cold. What is more, the drilling locations are often far from home. The result is a turnover in personnel, so vacancies usually exist. On the whole, the jobs pay well. In many cases, the people who work with their hands make as much as or even more than the experts who work with their heads.

Of all today's marine fields, the offshore industries offer the best employment market. This probably will continue to be true for many years, as we scratch to find every bit of the world's diminishing supply of oil and natural gas.



Food from the sea

One of the most ancient and honorable of careers is that of fisherman, a term that includes both men and women who harvest the living creatures of the sea. Naturally enough, most of those who go into fisheries as a career come from fishing communities, and quite often from fishing families. Traditionally, young people shipped as hands on a fishing craft and learned by doing and by example. This still is true, but now there are vocational fishing programs in several schools where the interested person can learn how modern fishing is carried on.

It is common to speak of "the United States fishery," but this is an unfortunate and misleading term. There is not one fishery; there are many. Commercial species vary from place to place, and so do fishing craft and fishing methods. There is a world of difference between the Oregon dory fisherman and the big tuna clipper out of California that fishes thousands of miles from home. The nearshore New England lobsterman with his string of pots has little in common with the scalloper out of New Bedford, and the only bond between the Chesapeake Bay crabber and the Gulf shrimper is that both are after crustaceans.

A number of American fisherfolk are independent business operators who own their own boats or have their own leases. Some are one-person or family operations; others may hire hands. A common way of doing business on the sea is to share according to what a person does. When the catch is sold and the profits split, there are so many shares for the boat and owner, so many for the skipper, and shares for the crew.

A green hand may rate only a part of a share until an apprenticeship is served and a full share is warranted, but this does not necessarily mean low pay. A good catch by a halibut fisherman in the Gulf of Alaska can mean a lot of money for a few weeks' work, even for a part-share.

Of all the sea people, fishermen probably spend the most time at sea, for the very good reason that there is no profit to be made ashore. It is difficult to generalize about fishing as a career because the variations are so great from fishery to fishery and place to place. On the average, it can be said that fishing is a career with satisfactions beyond simply making a living, and fishermen do make a living that ranges from barely getting by, in some cases, to very good in others.

It depends on the place and the fishery, and the only way to find out is to ask in your nearest coastal region. Some fisheries are pretty much closed to newcomers, but there are many where the skippers have a hard time finding

hands to go to sea. A young person who wants to fish, and is willing and reliable, will find a warm welcome.

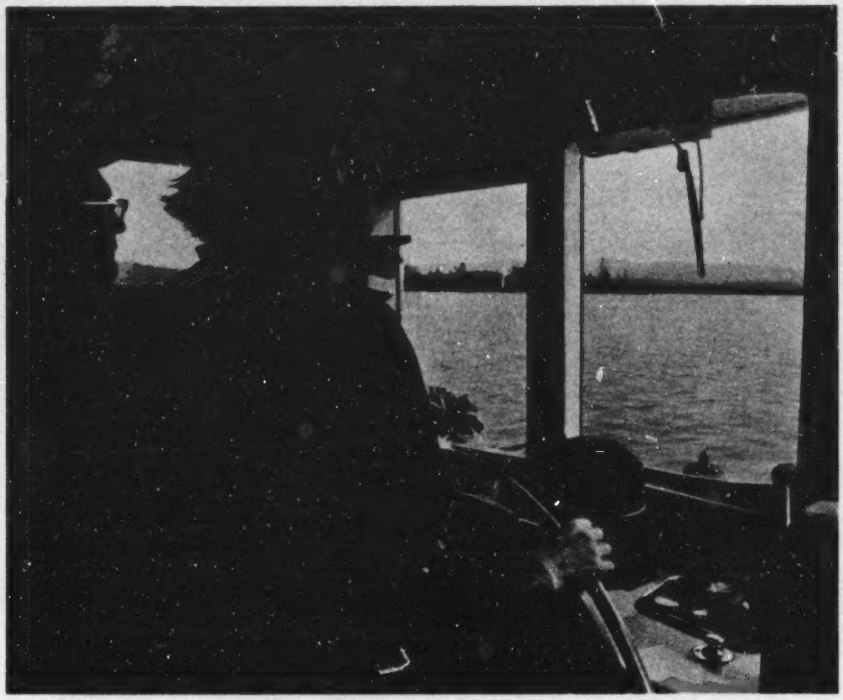
The person who catches the fish, though, is just the first in a long chain. As in most sea activities, there are a number of fishery careers, and the possibilities range from on-the-job training to the need for higher education. Among those who actually fish, an increasing number are college graduates. A degree is not necessary; it is just that some young people, usually from coastal communities, complete a college education before deciding what they want to do for a living, and then turn to fishing.

No fish ever has been known to ask if the fisherman has a degree in biology or business administration, but that does not mean the degree has no value. Elements of a college education are directly useful in understanding some of the new fisheries technology, in understanding the intricacies of such necessary tasks as filling out the fisherman's tax forms, or in following law of the sea developments that affect the fisheries.

Noncollege people have to learn these things too, of course; it is just that an educational background may make it a little easier. Most fish people, though, are not college graduates and do not need to be, but as technology advances in some fisheries, a vocational course becomes increasingly useful. The National Sea Grant Program has sponsored such courses, and information may be obtained from your nearest Sea Grant program.

Fisheries have to be managed, because the fish, or shellfish, are found in waters over which the state or Federal Government has jurisdiction, and the fish and shellfish stocks are common property of all the people—in theory, at least. State agencies and the Federal Government employ many fisheries specialists as managers, enforcement personnel, operators of government-owned facilities, and as researchers. People who graduate from fishery programs go into government work about as often as they go fishing.

This is true at all levels from high school to graduate school. The jobs and pay follow a pretty regular scale; the more education a person has, the more responsibility the job has and the higher the pay. At the top of an agency (just below the politically appointed administrators), the people are usually scientists with graduate degrees.



Commercial fishing does not end with fisheries management or with the catch itself. When the catch leaves the fishing crew that caught it, it is processors who take over and make the catch ready for market through freezing, canning, cooking, or other methods. The processing of seafood is another kind of activity with good career prospects.

The introduction of new technology means that we will soon be finding a much larger variety of seafood products on our tables. Operations in the plants will be more complex than at present, requiring people with more training. There are and will be opportunities for both technical- and scientific-level people, and for good engineers.

Marine operations

The world's goods move by sea. Raw materials, manufactured products, liquids, solids, and slurries all travel by ship, boat, and barge. Every vessel, whether a barge on the Columbia River or a supertanker on Puget Sound, must have its crew. More than 350,000 persons are directly engaged in marine operations, and the majority are aboard vessels of one kind or another at least part of the time. Keep in mind that even the heartland of America is served by water transportation. The agricultural products of the Midwest travel through the inland waterways to the coastal ports and from there by sea to their destinations. Similarly, the imports of Europe and Asia arrive on freighters, some of which travel up the great rivers to inland ports. Others transfer their goods at seaports, and the goods move through the inland water passages.

Except for the barges that are pushed or towed, all vessels need both deck and engine room hands. The number of crew members depends on vessel type, with the Coast Guard specifying minimum numbers for most commercial operations. As in all marine careers, there is competition for jobs, but there is also a rate of personnel turnover that means openings occur everywhere. How the openings are filled depends on the particular job. In some cases, union seniority makes the difference. Other jobs are not unionized. For most seagoing vessels, union membership is a necessity. There are, incidentally, union-operated schools for seamen.

A career in recreation

Recreation as a career sounds pretty tempting to those of us who are beachcombers at heart, but that is not quite what is meant. With 120 million people spending over $15 billion a year on coastal recreation, there are obviously a lot of jobs for people who build equipment and service it, and who operate facilities.

The recreation service industry is many small businesses, of which few can pay high salaries or afford people with special skills. The most skilled people are needed by those engaged in boat and engine maintenance and repair, or those that cater to divers. One kind of person the industry needs desperately is the good mechanic who cares about doing a good job.

The recreation equipment industry is another matter. As we noted earlier, two-thirds of the nation's boat builders are building recreational craft—about 400,000 persons. For the most part, they are skilled people who either acquired their skills in school or on the job. Thousands also are at work making fishing and other water sport gear.

One kind of recreation career you may not have thought about is in aquarium work, or in museums. If you like fish, this is work you might enjoy. Depending on the size of the operation, there may be one or more persons with degrees in biology as supervisors, assisted by skilled workers of several kinds. There may be people who prepare and maintain exhibits, serve as guides for visiting groups, or do the clerical work. Larger aquariums may have their own collectors, and some even have research staffs.

Scientists of the sea

The word that comes to mind when someone mentions scientists of the sea is "oceanographer." All oceanographers are marine scientists, but not all marine scientists are oceanographers.

The definition is pretty fuzzy, but in traditional terms, an oceanographer is a physical, chemical, geological, or biological scientist who practices the particular discipline or specialty in relation to the processes of the sea. Sometimes the term "blue-water oceanographer" is used to distinguish those scientists who go to sea on research vessels from those who work inshore. Perhaps one characteristic of the oceanographer, who must be a specialist, is the need for a broad background. It is difficult to understand the biology of the sea without also understanding its chemistry, or vice versa, and the physical scientist traces the movement of water masses by their chemistry as much as by their physical qualities. In turn, the presence of living creatures in the water affects its chemistry, and so on.

The scientists of the sea are a tiny minority of the sea people. There are more than two million persons engaged in marine work of some kind, but the 1975 edition of the *U.S. Directory of Marine Scientists* (published by the National Academy of Sciences) lists only 3,013: 1,291 biologists, 841 physicists, 693 geologists, 505 engineers, 467 chemists, 247 geophysicists, and 208 meteorologists.

(If you add these figures, you will see that there are more than 3,013. Many marine scientists list themselves under more than one category.)

The breakdown of marine geographic zones where the scientists work also is revealing. The blue-water oceanographers number 1,336, and they are slightly outnumbered by the 1,489 who are not seagoing types, giving their place as the coastal zone. Those who work in the coastal zone are not generally considered oceanographers. Another 871 work in the estuaries where the rivers and streams meet the seas, and they may sometimes be called oceanographers. It does not really matter; they are all marine scientists.

The directory is not complete, but it probably represents a good percentage of the nation's marine scientists. Even if we assume that only about half are listed, the total is still a pretty small percentage of the total marine workers. Yet the scientists probably are more visible through the mass media than any other group, so science comes to mind at once when we think about sea careers.

To be a scientist requires higher education. A bachelor's degree places you at the technician level, and that will not carry you very far. A master's degree is much better, and a doctorate is best of all. The major research institutes and universities want scientists with doctoral degrees and usually will not settle for less, unless the person happens to be extraordinarily brilliant and talented. Of course, people of all levels of education are found in the research institutes and university research centers. Many of these are graduate students who are employed in one fashion or another, usually at very low pay (a "stipend" or an "assistantship") while working toward a higher degree. But the senior people, with very few exceptions, have doctorates in the basic scientific disciplines or engineering specialties.

Federal and state scientific agencies hire marine scientists at all levels, and these agencies are usually good career choices. The scientists may do research, but they are also engaged in management, program and project direction, enforcement, planning, and public services of various kinds.

An important group of careers that involves both universities and government might be labeled "communication." The results of scientific research and technological successes must be communicated to the people who will apply them. Results may be communicated by technical writers, teachers, specialists in public communication, and advisory agents. To be a communicator requires some degree of scientific or technical background plus writing skills. A person working in advisory services deals directly with people who need specific marine information, often helping them to put

the information to work. The advisory person therefore needs skills in working with people as well as the technical background and writing skills. There are only a few hundred marine communicators and advisory service agents, but for people with the skills and talents, these careers are especially rewarding because the results often are visible in a short time.

There are jobs in private industry, too, and if a major national ocean program develops, the number of industry jobs will expand.

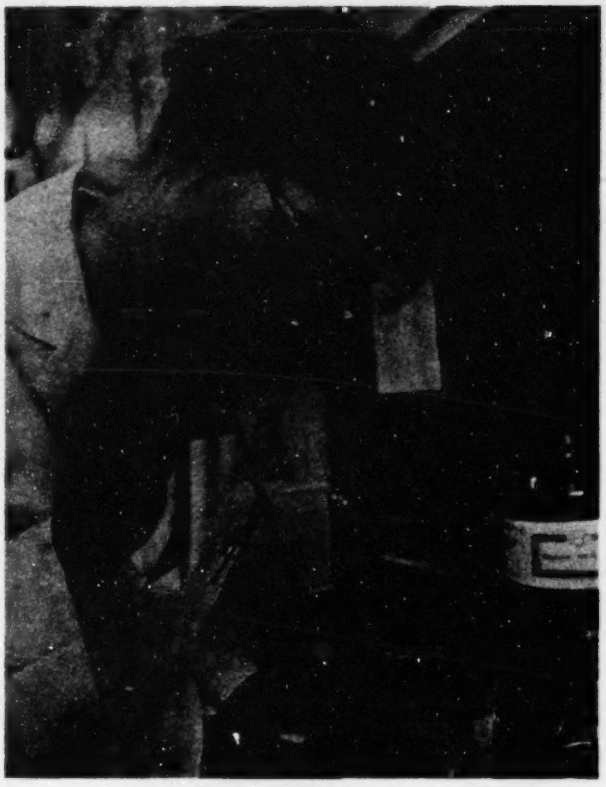
A number of marine scientists are working in environmental fields. Some are in water quality laboratories, and others are collecting data for the environmental impact statements required by law when any change in the environment is planned. The number of environmental jobs should increase in the future.

Are there jobs in marine science? The answer has to be yes, simply because there is turnover in any field. But the jobs are few and the competition very intense. This situation will continue unless there is a big, unexpected (and unlikely) increase in Federal and state support for marine science programs.

The future of aquaculture

Related to careers in science, in the popular view, are careers in aquaculture, which is the farming and husbandry of aquatic animals and plants. It is true that aquaculture is a growing industry, but it is not true that it is or soon will be a major employment market. In any commercial aquaculture operation, people are needed, but even large operations do not require big staffs of specialists. Most of the hands can be trained on the job, do routine work, and are not highly paid.

Another reason why aquaculture will not be a major employer is that it cannot grow very fast or very large in comparison with other businesses. Government regulations of all kinds, at all levels, make it very difficult to go into the aquaculture business, and in some states it is nearly impossible. Where it is possible, the aquaculturist needs good land and good water, for which there is strong competition from other businesses. So, while aquaculture will continue to grow in this country, the number of people employed will be counted only in the hundreds for some time to come.



Some scientists are social

The mass media leave the impression that natural scientists run the marine world. To be sure, we could not get along without the biologists, physicists, chemists, geophysicists, geologists, hydrologists, meteorologists, and so on. But not enough people realize that the real problems to be solved if the waters of earth are to be properly used and protected are not scientific or technical, but economic and social.

As we turn more and more back to the sea for minerals, oil and gas, food, and raw materials, we need to look at the future in economic and social terms. We find that neither our institutions nor the traditional law of the sea are adequate even for today's ocean—and must be changed drastically to meet the needs of tomorrow. In short, we need more marine social scientists, including lawyers.

Perhaps one of our greatest needs is for marine managers. This is true throughout the whole fabric of marine affairs. The public agencies concerned with the uses of the coastal zone need managers, and so do such businesses as aquaculture. People who have combined marine studies with law, business administration, or public administration are in demand now, and the demand is increasing.

Naval architects and ocean engineers

All technology requires someone to design it and someone to build, place, and operate it. Sea technology is no exception. The design of constructions for sea use, whether floating, fixed, or submerged, is the task of naval architects. Design for the sea is more demanding than for the land because the sea is a fluid, never the same two moments running, sometimes quite violent, and not very predictable. Ocean engineering is concerned with the same difficult fluid, and the ocean engineer has to contend with problems the land-based engineer does not face.

As with scientists, engineers are educated in their basic specialties first, and apply their specialties to the sea later. At the design level, naval architecture and ocean engineering are very closely related.

People educated as civil, electrical, mechanical, industrial, and sanitary engineers have applied their basic specialties to marine tasks and have become ocean engineers. Even aerospace engineers have been called upon to use their special knowledge in submersible and undersea habitat design. Petroleum engineers work on continental shelf oil just as they work on land.

Ocean engineers and naval architects are employed by industry, government, and universities. If engineering is your thing (which means that mathematics is one of your strong points), there are some excellent colleges that are strongly oriented to the sea. Do not be confused by words. Ocean engineering and marine engineering may be the same (but marine engineering may also mean the kind of engineer who runs the engines aboard ship).

The marine technicians

A seagoing type of marine technician is the "oceanographic aide," a person skilled in handling shipboard scientific equipment, and in calibrating and maintaining it. Such technicians are employed by universities with research ships, government agencies, and some industries. More and more, however, routine measurements at sea are being made by remote sensors that feed data direct to data storage aboard ship, and the technician is primarily an electronics specialist, very often trained by the company that makes the equipment.

For the most part, the marine technician applies land skills to the special case of the marine environment. What a marine technician needs most of all is the ability to solve problems and the kind of personality that gets real enjoyment out of tackling a tough, hands-on job and getting it done.

Some two-year colleges train technicians to work in biological, environmental, and water quality programs. Many young people graduate from such programs and get good jobs, but there are others who find themselves in competition with graduates of four-year programs and even with people who have received graduate degrees. The reason is that too many people have sought careers as biological scientists. When they cannot find jobs as scientists, they are glad to take jobs as technicians. A really smart employer will hire a technician to fill a technician's job, but too many employers think a higher degree means a higher degree of skill, and that is not necessarily the case. Before beginning a two-year marine technician course of study, check up on how effective the school has been in placing its graduates in jobs related to their studies. There's a wide variation.

Fewer young people would be misled if we dropped the term "marine technician" and just referred to vocational programs. For instance, there are always jobs, usually good paying ones, for mechanics. Engines are engines, whether on land or sea. Those in use on salt water have special requirements because the sea is so corrosive and is a conductor of electricity, but those requirements are minor add-ons to the basics of engine maintenance and repair. Diesel mechanics are always needed, and outboard motor mechanics who can really service and tune are not plentiful. A really good engine mechanic who can "fix anything" and is willing to go to sea is much harder to find than a graduate in the sciences, and usually receives higher pay.

Another needed skill is the welder's. Most marine construction depends on welding, and the well trained welder is always sure of a job.

If you ask many sea people about who is the most important person on the ship, on the boat, or on the platform (not including themselves, of course), you might be surprised at how many would answer, "The cook!" Most galleys on vessels or platforms cannot have the elaborate setups of a shore-based feeding facility, but the quality of the food is even more important. Food is a morale factor for people who spend time on the water, and a cook who can turn out fine meals under difficult conditions with limited facilities is one of the rarest of important sea people. Cooks are not usually listed as "marine technicians," but they should be. Or, since cooking is a combination of skill and art, maybe they deserve a special category: marine culinary artist.

Where do we learn to be sea people?

Once you know the direction in which you would like to go, the next problem is locating the proper school. For most of those heading for a college degree, the basic fact of life is that there really is not much difference among universities for the first year or even two. When you choose a major, the difference is somewhat more pronounced, but not as much as you might think. If you are going into the natural sciences, you will find that basic biology, chemistry, or whatever, is pretty much alike everywhere. Naturally enough: the principles and facts of a scientific discipline are universal.

Only a few universities have marine specialties at the baccalaureate level, because the guiding principle is that one learns the discipline first and applies it to the sea in graduate school. This is not very satisfying for those who want to leap into salt water, figuratively speaking, their first day in college, but it is traditional.

If you insist on getting into marine matters at once, then it is necessary to choose a school that meets your requirements. The best source of information is a publication called *University Curricula in the Marine Sciences and Related Fields*. It is not easy to find because it is distributed only in limited numbers. If your science teacher, guidance counselor, or library does not have a copy, and if you are not near a college or university with a Sea Grant Program, then write to the National Sea Grant Program at 3300 Whitehaven St. N.W., Washington, D.C. 20235. The publication will help you to locate universities or other schools that may have what you want, and the next step is to get their catalogs for more specific information. Of course, you do this by writing directly to the schools.

If you are interested in a two-year technical program, start by finding out what your own local community or junior colleges have to offer, keeping in mind that marine jobs begin on land. For example, you can learn to be a supermechanic or an electronics whiz half a world away from the water. But if what you want is not available in your vicinity, the *University Curricula* volume lists some two-year technician programs, too, including fisheries programs.

During the next few years there may be an increase in the number of high school vocational marine courses, especially in coastal states.

Depending on the kind of person you are and what you want from life, an answer to your problem may be one of the uniformed services. We noted earlier that many commercial divers learned in the Navy, and we might add that ex-Navy boat operators, navigators, riggers, welders, communicators, and mechanics are found everywhere in the sea trades, too.

U.S. Coast Guard personnel probably spend more time in intimate contact with the water than any of the sea people except fishermen, and they can learn nearly all of the sea skills as specialties. Both the Navy and Coast Guard have their service academies, of course, for those who can qualify and who wish to become officers.

Less well known is another uniformed service, that of the National Oceanic and Atmospheric Administration of the U.S. Department of Commerce. At one time, this NOAA organization was known as the Coast and Geodetic Survey. It is now the National Ocean Survey, and its uniformed personnel are officers aboard the NOAA research and exploration ships. The NOAA officers attend the U.S. National Maritime Academy at Kings Point, New York, where officers of the merchant marine also are educated. If being a deck or engine room officer of the merchant marine is where you are headed, several states have their own maritime academies.

If you are typical, you are probably unsure of what you really want. This is natural enough, because, at the age when we begin to think about a career, we are not old or experienced enough to have had much chance to try different things. But why worry? There is no big hurry. The dropout rate in some programs is very high just because reality proves to be quite different from preconceived images. It is no disgrace to drop out when you find you have chosen wrong, but it can be expensive, so do your homework first.

What if you are a woman, a black, an American Indian, or of Hispanic descent? Is it worthwhile for you to study for a sea career? You bet it is! Qualified minority people are in demand. Affirmative action programs require hiring of minority people, and in some sea trades it is difficult to find qualified women and minority persons. You will actually get preference. But qualification is important, especially in offshore jobs where lives hang on the competence of working team members.

Whether you should go to college, go into a vocational program, consider a uniformed sea service, or anything related to a career depends on the kind of person you are, what you hope to get out of life, and what you are happiest doing. And that is the next subject.

Your reflection in a sea wave

We identify ourselves with adventures, with great accomplishments, with work that is fun in beautiful places. But when it comes to seeking a career, enjoyable fantasy must be put aside. The place to begin seeking is in your own mirror.

What kind of person are you? What are you really like? Think back. What has given you the most real personal satisfaction? Do not look for those things for which you were praised or rewarded, but for the things that meant the most to you. Was it building things? Was it solving problems or puzzles? Was it reading some really enjoyable books in which you lost yourself completely? Was it writing, perhaps even something you never showed to anyone else?

Are you mostly an indoor person, or can you hardly wait to get outdoors? Do you really enjoy studying, or do you study just because you know decent grades are important? Do you like working with your hands, or are you all thumbs? Are you curious about everything, or do you get interested in only one thing at a time? Do you have to be physically active most of the time and get restless when you are not? Can you work quietly at desk or table?

Are you strong in some subjects and weak in others? Or are you weak in all school subjects and have to drive hard to keep grades up? Are you a leader or a follower? Do you like to work alone, or are you most comfortable with a team?

Try to answer these questions honestly. Look at possible careers for how they relate to your kind of person, not to some image you carry in your head. The idea is to pick the kind of career best suited to your kind of person, to your talents and skills, and to your interests.

Something else that is important: forget about that artificial and useless thing called "status," which says that one kind of career is somehow superior to another. Too many young people go for a career because it seems to be more important, of higher status, or is "glamorous." The best career for you is one that you enjoy, that gives you the feeling of accomplishing something, that has opportunities for personal growth and advancement, and that will pay well enough, when you have earned it, to give you the standard of living with which you are comfortable. From your personal viewpoint, it does not matter whether it is blue collar, white collar, or no collar —if it is rewarding to you. This is important, because only a very small percentage of sea people work in what you might think are glamorous, high-status jobs, of the kind you see on television. The sea is a great leveler, and scientists get just as seasick as the oilers and deck crew.

Keep your perspective about what is important. The highly educated senior scientist who seeks to solve a sea mystery must have a vessel to work from, instruments of great precision that are perfectly calibrated to make essential measurements, a computer programmer to set up the program that will integrate the results, and a variety of people to help at every stage of his or her research. The scientist cannot perform without people who have a number of skills the project needs, and without which it cannot succeed.

Who is important? If the skilled technician does not prepare and service the instruments properly, results are false or zero. If the navigator does not put the scientist precisely on station, the experiment may be off to an important degree. To the research project, the technician and navigator are just as important as the scientist.

The scientist, the technician, the geologist, the rigger, the commercial diver, the driller, the welder, the deck hand, the wiper, the seafood technician, the engineer, are usually quite different kinds of people who probably look at life differently and get their rewards from different kinds of accomplishments. There may not be very much difference in their incomes.

How much a person makes depends on the job, how compensation is set up, seniority, location, hazard, degree of skill and how rare skilled people are, union requirements and contracts, and so on. It is not unusual for sea people who work with their hands to have incomes as high and often higher than those who work primarily with their heads. This is especially true in the offshore trades.

So, what kind of person are you? Where would you fit best among the sea people? Only you can answer this key question.

Getting a job among the sea people

There is no clearinghouse for marine career jobs, any more than there are clearinghouses for air or land jobs. The ocean societies, like the Marine Technology Society, the American Oceanic Organization, or the American Littoral Society, often get mail from people wanting jobs, and they are not in a position to help.

Universities and vocational schools try to help their graduates, and some schools have very fine placement records. Others do not.

For the most part, getting a job means making the rounds, either in person or by mail, or both, and trying to sell yourself to an employer.

If you have really done any serious looking in your special field of interest, you ought to know where to find lists of employers—lists of companies and agencies in your general field. Each of the trade publications, like *Ocean Industry*, *SeaTechnology*, or *Commercial Fish Farmer*, has an annual edition that serves as a directory. Annual meetings of organizations in your field are another source of information, and of job contacts. The trade and professional publications in your field carry listings of meetings at which potential employers gather. Do not look under "potential employers," but under "meetings" or "conferences," and know that some potential employers will be there.

If in doubt, write. Write to the personnel offices of commercial firms, employment offices of state or Federal agencies, to headquarters of unions. Visit the U.S. Employment Service in your town and see what kinds of catalogs and lists it might have, and talk with the USES people about what you would like to do. They are not usually well informed on marine-related jobs, except in coastal communities, but you cannot be sure what your local office has until you try.

Do not write to individuals who may be prominent in marine fields. Either your letter will be ignored, or you put the person in the position of having to write an unnecessary letter which says the person is unable to help you, and asks whether you have consulted the directories of possible employers in your local library.

But *do* plan your strategy. Firing letters and resumes off in all directions is not the way. If you write to a commercial company, know what that company does, and that it employs your kind of people. Unless you know an individual who can help you in a company or agency, write to the personnel director or employment office. Writing to the president or agency administrator buys nothing. That august person will never see your application, anyway. A secretary will route it to personnel, and a clerk in the personnel office will decide you are not very sharp or you would know that the Number One Superboss does not see job applications.

Keep in mind, also, that an employer wants to make the best bargain possible. You may know what a potential sea star you are, but the employer does not. In screening applications, neatness, spelling, and good grammar do count. As in any field of endeavor, make the best impression you can.

As a final note, most people change careers three or four times during their working lives. So stay flexible. Career decisions are seldom forever.

The sea does its own selecting, and there is no way of telling, without trying it, whether the sea will select you. Keep one foot on the land until the sea accepts you as one of the sea people, and do not worry about wasting time, energy, or education. If you train for a sea career and find that it is not for you, you will do better among the land people because of your sea training. You will be more adaptable, flexible, and skilled—and you will know better than most where to find your own niche.

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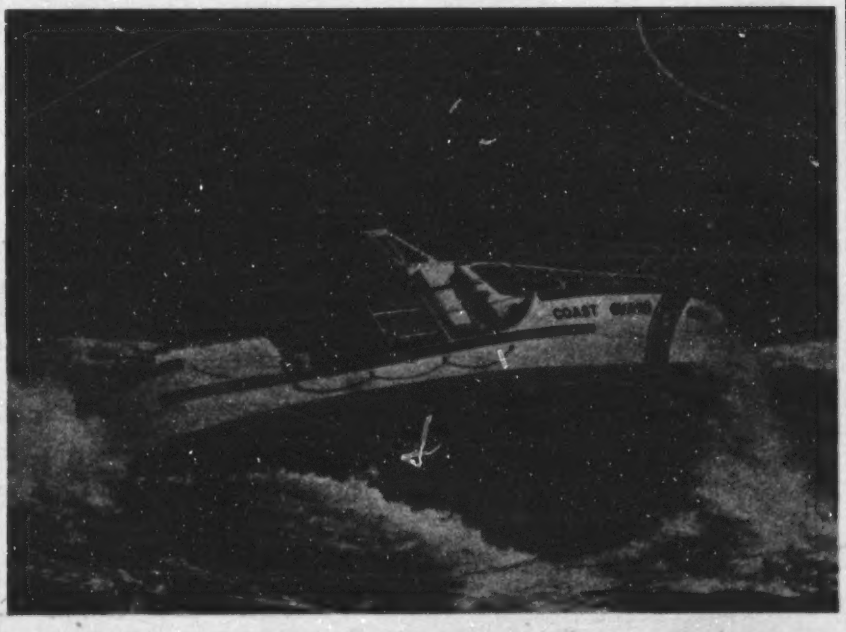

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